

The latest changes are accomplished after the escape of the embryo of *Gebia littoralis* from the egg.—*Zool. Anzeiger*, xvii. Jahrg., no. 452, July 16, 1894, pp. 253-256.

On Gill-like Organs in certain Species of Sipunculus.

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That the tentacles in Sipunculidæ possess the faculty of respiration was formerly a matter of almost universal belief. Lately, however, at least in respect of certain genera, many doubts have been expressed as to this. It had already been pointed out by Brandt*, that in the case of *Sipunculus nudus*, L., the extraordinary thickness of the layers of connective tissue in the tentacles would militate against the view that respiration could be effected by means of these organs. The same conclusion is also deduced by Ward†, who had the opportunity of observing the living *Sipunculus nudus* in an aquarium at widely different times and in very various situations. This author states that he has seldom seen the tentacles extruded and never for a longer period than from one to two seconds; in the retracted condition he does not believe that they can be of any importance whatever for the purpose of respiration. Moreover, he adds that since no connection can be shown to exist between the blood-vascular system and the cœlome, the peripharyngeal vascular ring and the two short contractile vessels would present far too small a surface to the body-cavity to be able to convey sufficient oxygen from the blood-vascular system to the latter.

If it was thus impossible in the case of *Sipunculus nudus* to concede to the tentacles the possession of a respiratory faculty, it was natural to suppose that the skin might possibly be able to discharge this function. In his paper on *Sipunculus nudus*, Andræ‡ had already described dermal canals, which traverse the entire body and lie in the region of the cutis close beneath the cuticle and hypodermis; the author terms these structures integumentary canals (Integumentalcanäle). He found them generally packed with ova and blood-corpuscles, and he maintains that the dermal layer, which separates them from the exterior, is sufficiently thin to enable an exchange of gases to take place between the cœlomic fluid and the sea-water. Ward, too, agrees with this

* Alex. Brandt, "Anat.-histologische Untersuchungen über *Sipunculus nudus*, L.," Mémoires de l'Acad. imp. des Sciences de St. Pétersbourg, 1870, tom. xvi. no. 8.

† H. B. Ward, "On some points in the Anatomy and Histology of *Sipunculus nudus*, L.," Bull. Mus. Comp. Zool. xxi. (1891) pp. 143-182 (3 pls.).

‡ Andræ, "Beiträge zur Anatomie und Histologie des *Sipunculus nudus*," Zeitschrift f. wiss. Zoologie, Bd. 36, pp. 201-208.

view: "The numerous dermal canals," he writes, "which run close beneath the cuticle and hypodermis, are undoubtedly of greater value for respiration and offer a far larger surface for the direct transmission of oxygen to the cœlomic fluid than the entire vascular system"*. The integumentary canals, as has been shown by Vogt and Yung†, are in connection with the general body-cavity, of which they are evaginations, so that their contents are met with again in the cœlome; they are found in the integument of almost all species of the genus *Sipunculus*. I believe that I have discovered a confirmation of this view in a specimen of *Sipunculus mundanus*, Selenka and Bülow, which was obtained by Herr Pässler near Esmeralda, in South America, and handed over to the Hamburg Natural History Museum.

This worm at once excited my astonishment by the possession of long, tuft-like processes from the integument of the middle portion of the body, such as I had never observed before in a species of *Sipunculus*. These structures are from 1 to $1\frac{1}{2}$ mm. in length, and are consequently distinctly visible even to the naked eye. On examination with a lens it is seen that these appendages are situated upon linear elevations of the integument, which are inclined at a somewhat acute angle to the longitudinal axis of the body. Transverse sections showed that the tufts in question are prolongations of the integumentary cavities which traverse the cutis. Their contents are the same as those of the cavities, and they possess a very thin skin, so that I do not hesitate to regard them as organs of a branchial nature. They correspond in shape to the pectinate gills of the body-segments of certain Annelids.

I have observed similar conditions in the case of *Sipunculus australis*, Kef., which differs from all other species of the genus *Sipunculus* in the possession of wart-like papillæ on the proboscis and in the glans (Eichel), which have hitherto been termed "dermal bodies" ("Hautkörper"). Dermal bodies, however, are always packed with glands or else with nerve-layers, while the warts of *Sipunculus australis* contain extraordinarily wide integumentary canals, or even several of these structures, and are consequently in no way comparable to true dermal bodies, but might rather be interpreted as rudimentary branchial processes.—*Zoologischer Anzeiger*, xvii. Jahrg., no. 457, September 24, 1894, pp. 333-335.

* [Ward's actual words are:—"The numerous dermal canals close under the hypodermis of *S. nudus* are unquestionably of great value in respiration, and the region of the introvert, which is distinguished by thin cuticular and muscular layers, actually not so thick as the walls of the tentacular fold, presents a far greater surface for the transmission of oxygen directly to the cœlomic fluid than the entire vascular system" (*loc. cit.* p. 164).—TRANSL.]

† Vogt and Yung, 'Lehrbuch der prakt. vergl. Anatomie,' Bd. 1.